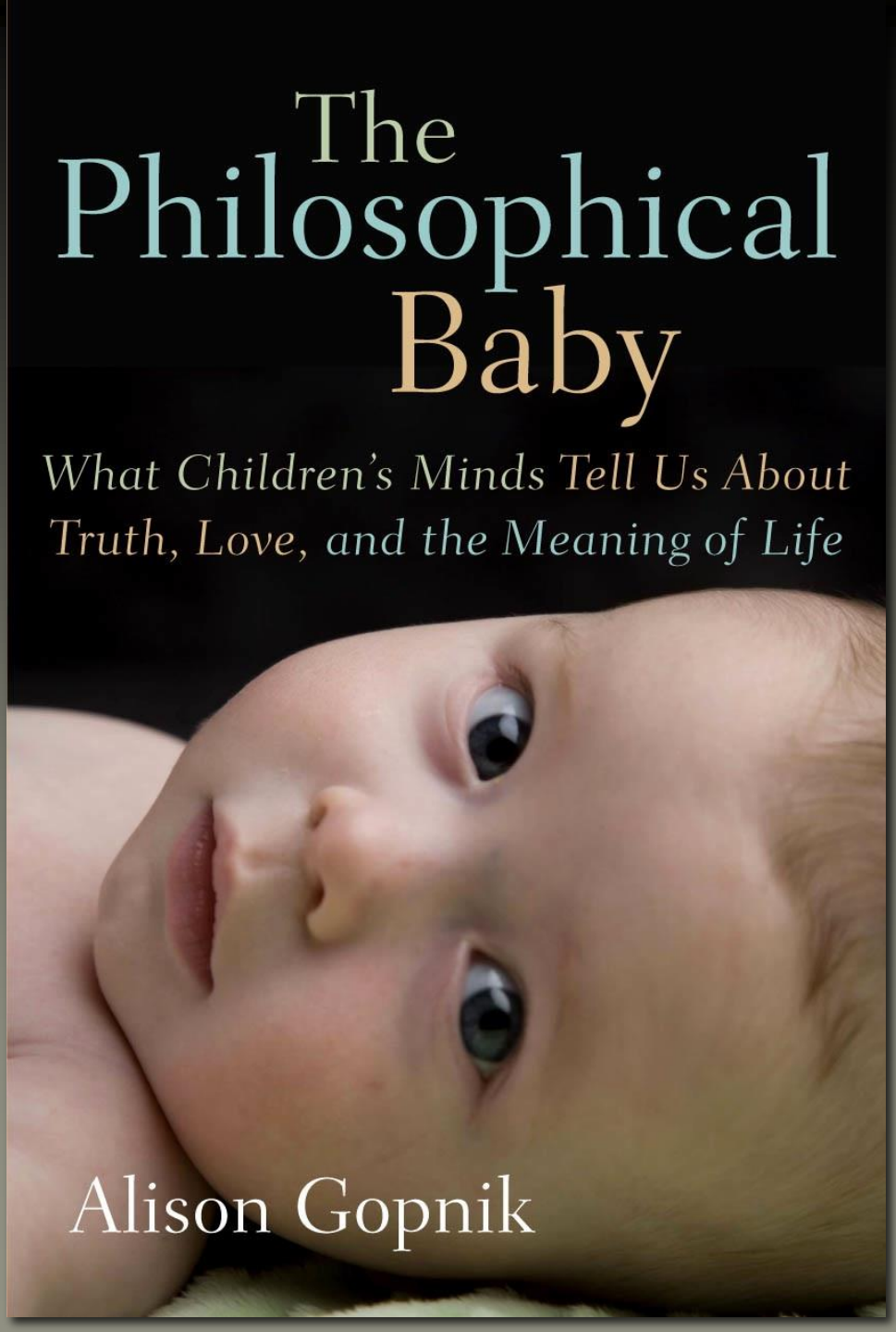
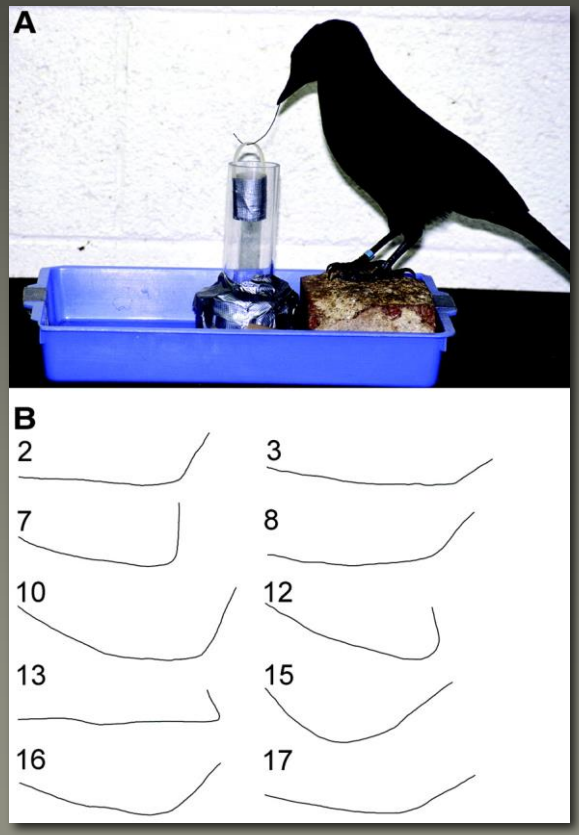
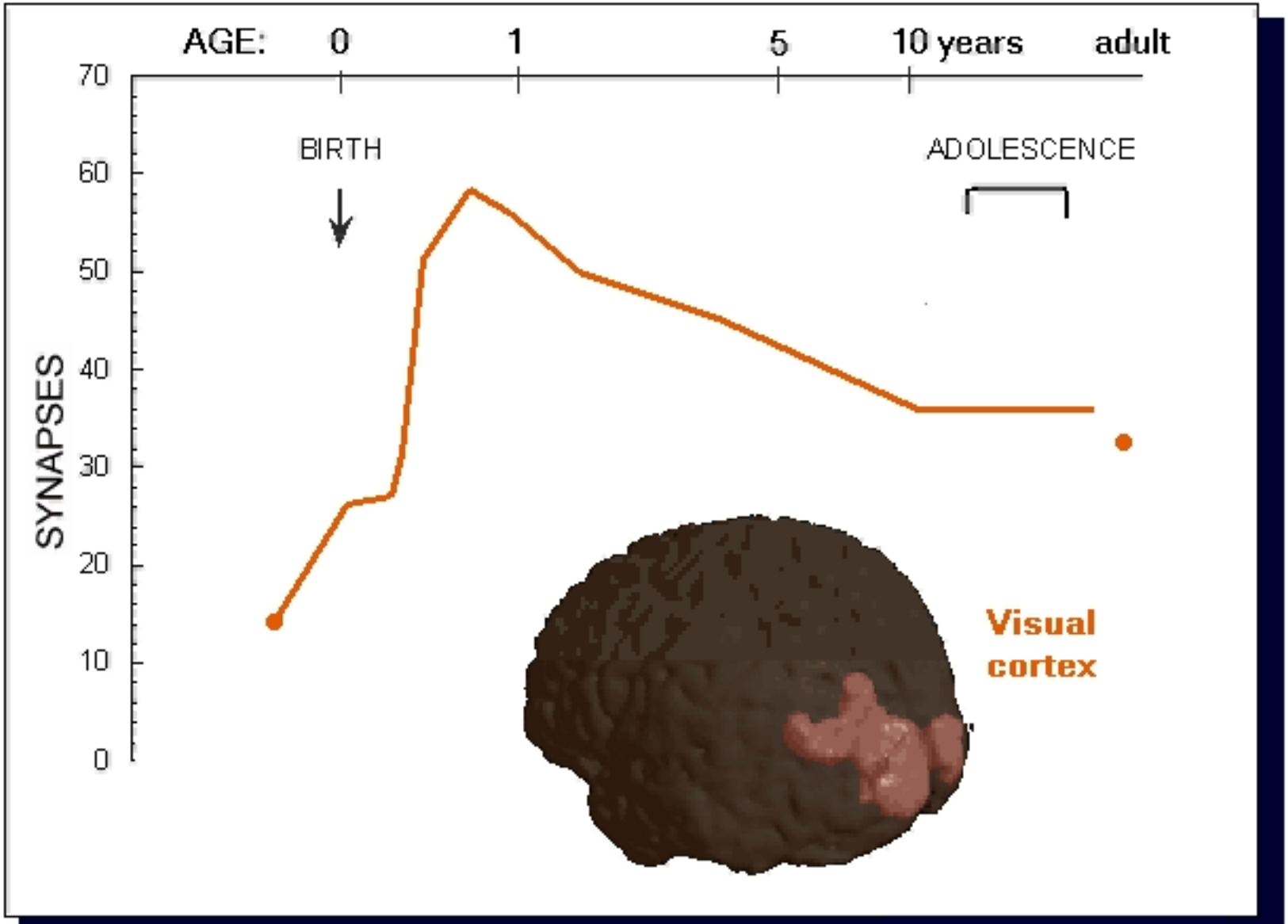

The Philosophical Baby
What Children's Minds Tell Us About Truth, Love, and the Meaning of Life
Alison Gopnik

Longer Childhood, Bigger Brain, Smarter Animal



It Takes a Village to Raise a Quokka

Human Brain
Development of Connections (Synapses)



Adapted from P. Huttenlocher et. al. (1979-1997)

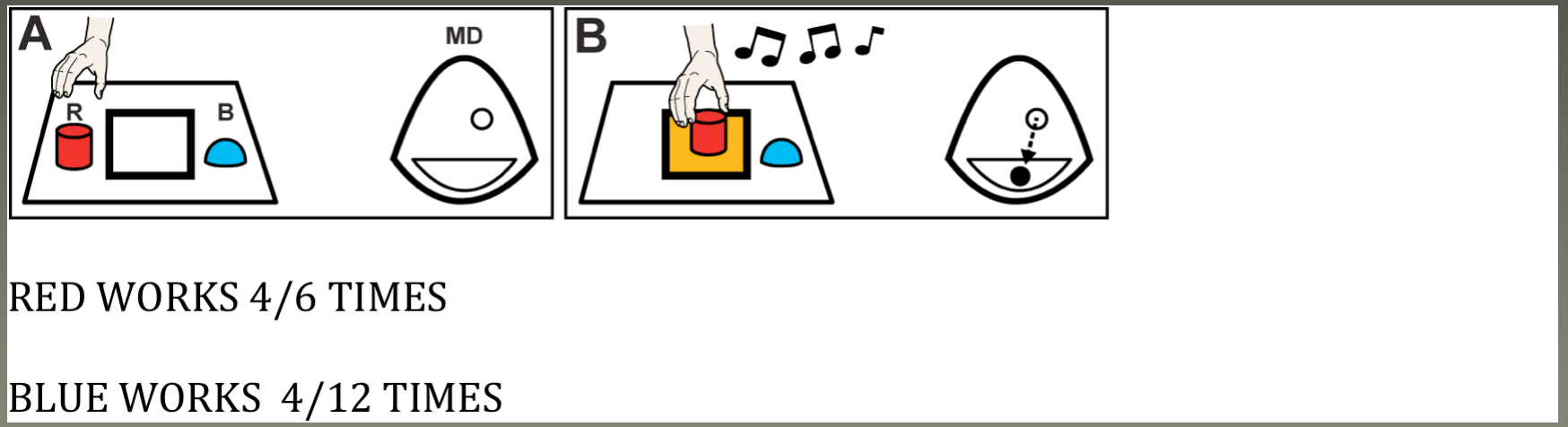
How Children Learn

- Like Scientists
- Analyzing Statistics
- Doing Experiments

The Blicket Detector

Some blocks are blickets. Blickets make the blicket detector light up and play music.

24-Month-Old Statistics

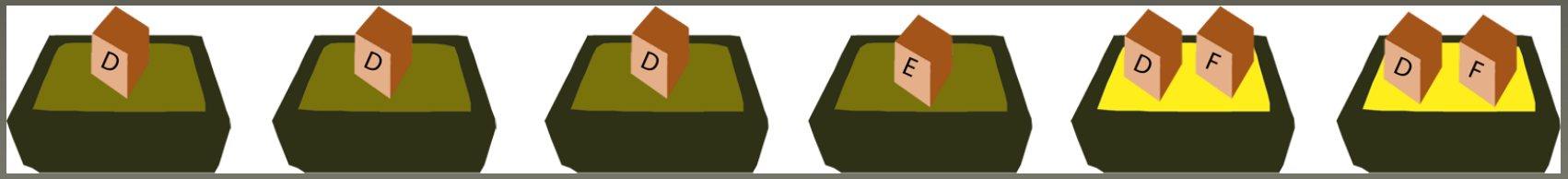


RED WORKS 4/6 TIMES

BLUE WORKS 4/12 TIMES

Waismeyer, Meltzoff, & Gopnik
Developmental Science (2014)

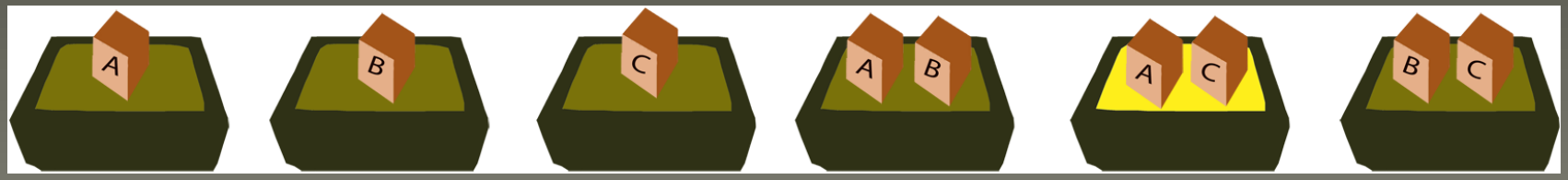
Which objects are blickets?

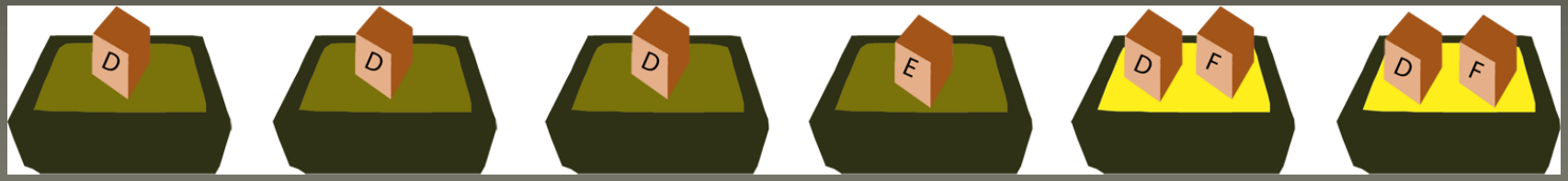


Is D a blicket? Is E a blicket? Is F a blicket?

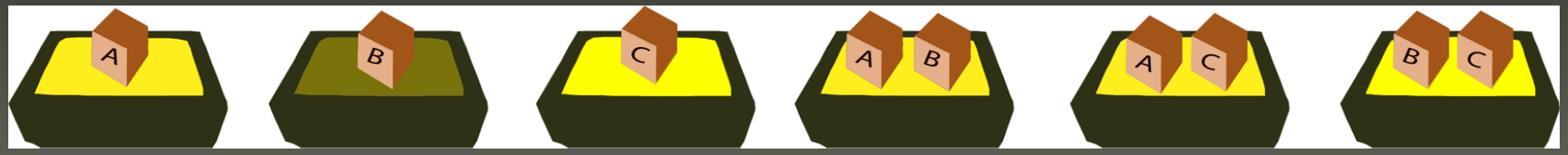
Lucas et al.. 2014

What if you also saw these events?

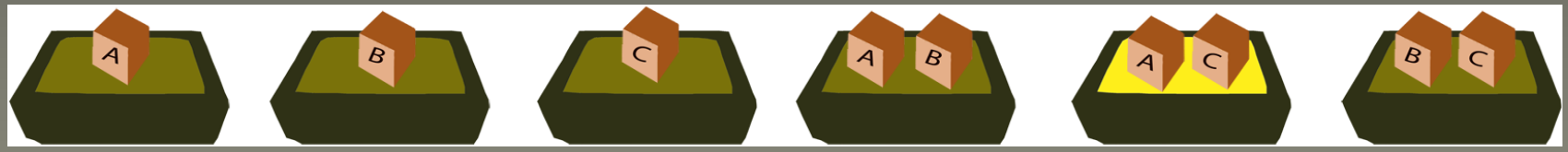



D
D
D
E
D
F
D
F

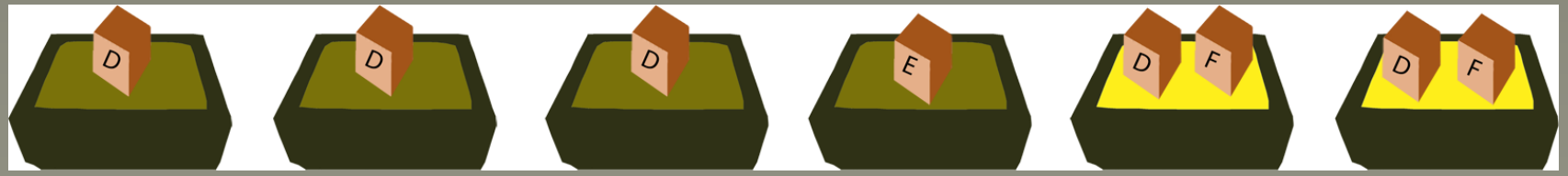
“Or“ Training

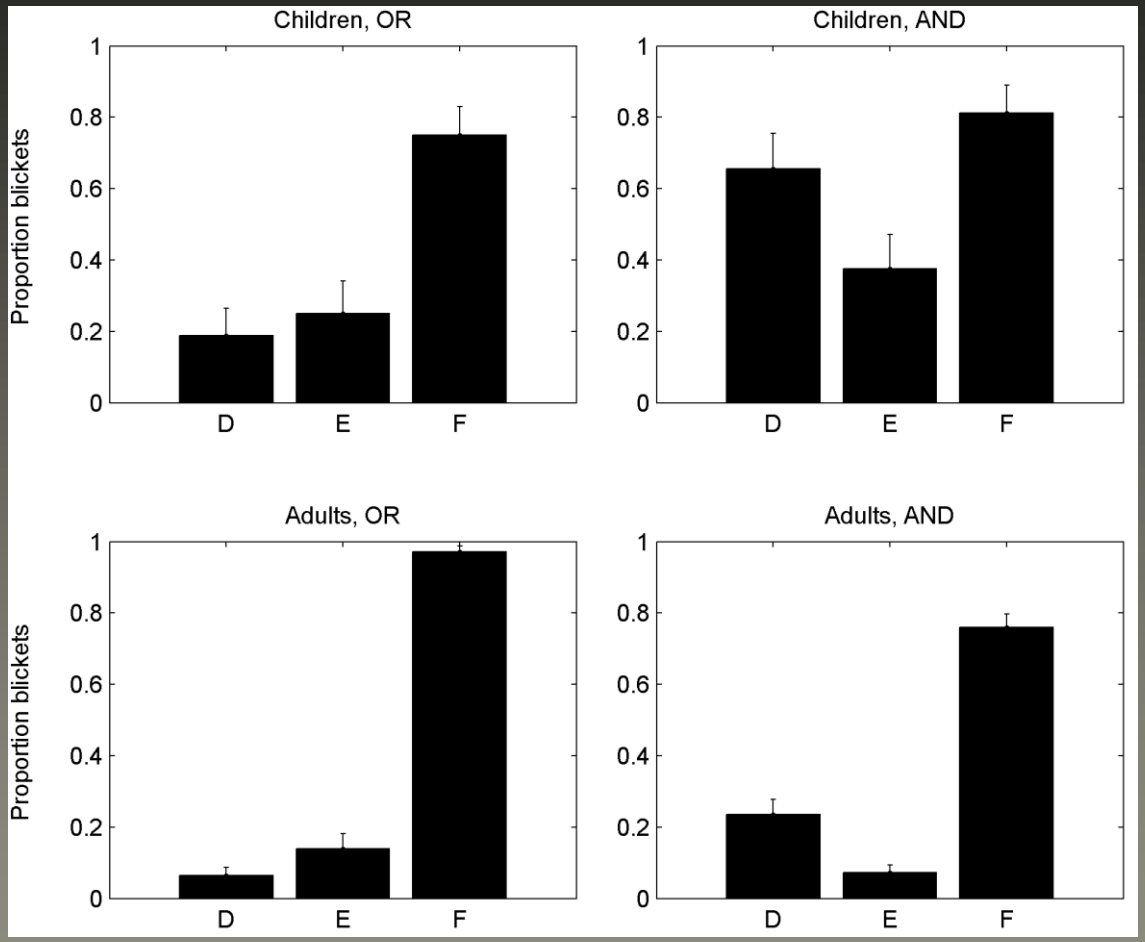


“And” Training



Test




Children, OR
Children, AND
Adults, OR
Adults, AND
Proportion blickets
Proportion blickets
0
0.2
0.4
0.6
0.8
1
D
E
F

Imitation, statistics and pedagogy

Buchsbaum , Gopnik, Griffiths & Shafto, 2009

Current Study - Overview

- What parts of causal action sequences do children choose to imitate?
- Do they imitate different portions of sequences when given different statistical evidence about their effectiveness?

Experiment 1

- Children 3-5 years old (median 4.3 years)
- Two musical toys
- 6 possible actions on each toy
- Combinations of 3 actions are demonstrated
  - Some cause the toy to play music, some don't
- Which of the actions will children imitate?

Pull Handle | Squish | Squeeze Bulb | Shake | Pull Ring | Flip it over

Pet | Stretch | Roll | Knock | Squish | Shake

Evidence Patterns

“ABC” Condition	“BC” Condition	“C” Condition
ABC+	ABC+	ABC+
DEC	ADC	ADC+
ABC+	DBC+	DBC+
EDC	AEC	AEC+
ABC+	EBC+	EBC+

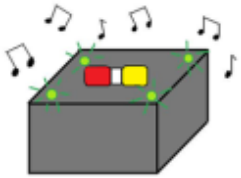
Le Gare: Play as Experiment

EXPERIMENT 1

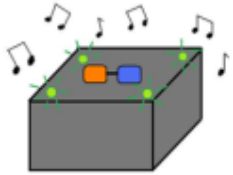
"ALL BEADS" "SOME BEADS"

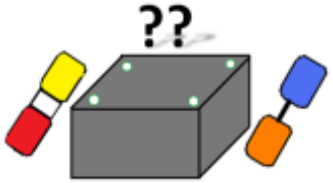
OR

Glued pair



Separable pair



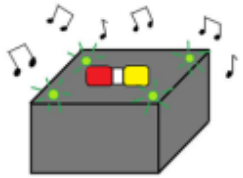


EXPERIMENT 2

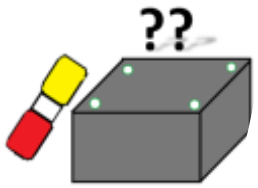
"ALL BEADS "SOME BEADS"

OR

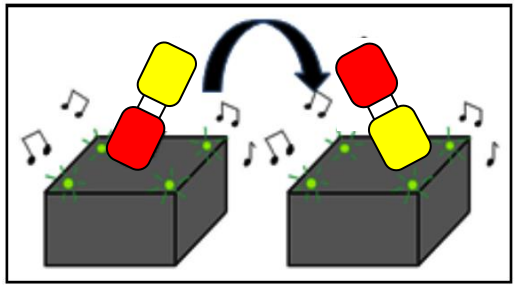
Glued pair



Demonstration phase
(*All pairs activated the toy*)



Free play
(*60 seconds*)

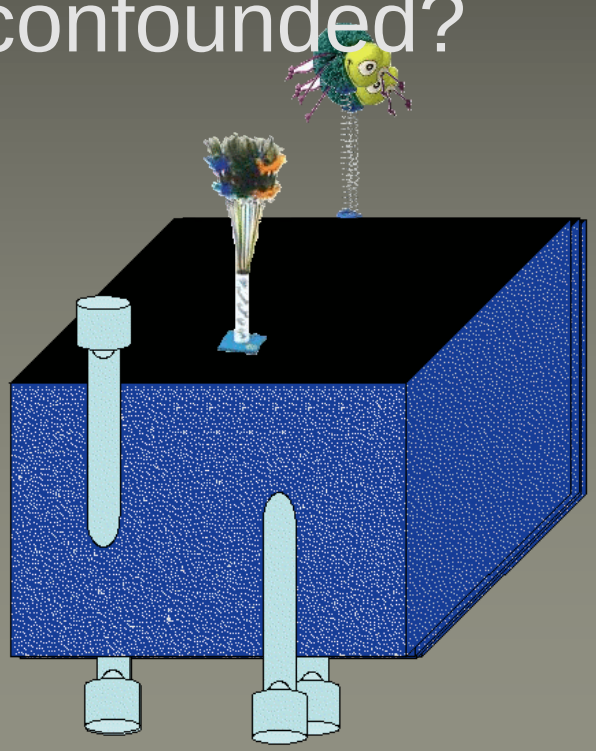


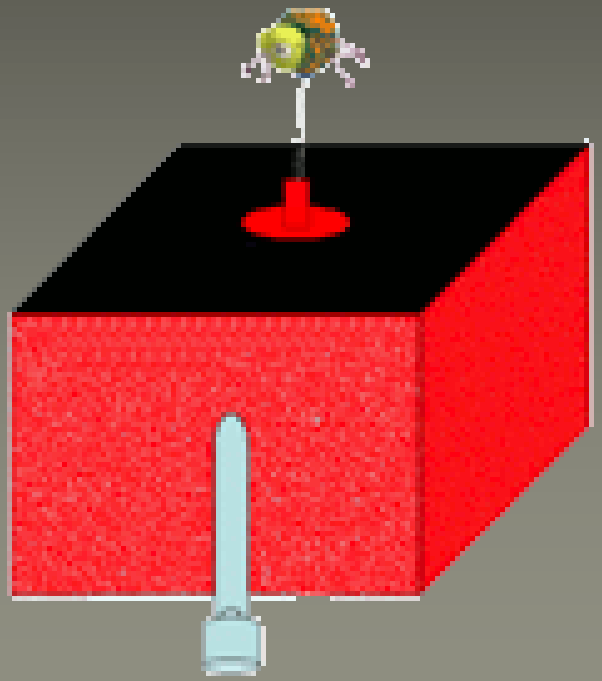
Cook, Goodman and Schulz, 2011

Children's Exploratory Play

Do children recognize when evidence is confounded?

Do children play more when evidence is confounded?





Schulz & Bonawitz, 2007

Novel Toy

- Four interesting properties

Bonawitz, Shafto, Gweon, Katz, Chang, & Schulz, 2009

Understanding Other Minds: Repacholi and Gopnik

Understanding other minds;

- Statistics - Kushnir, Wellman & Xu

Imagination: Imaginary Companions

Marjorie Taylor: Imaginary Companions and the Children Who Create Them

Monkey's Birthday

- Two within-subject phases
  - Counterfactual phase
  - Pretense phase
- 52 preschool age children
  - 26 four year olds
  - 26 three year olds
- "Birthday machine" for Monkey's birthday

Counterfactual Phase

- Introduced to “birthday machine” and two objects
  - Plays happy birthday when “zando” is on top
  - Does nothing when “not a zando” is on top
- Asked counterfactuals
  - “if this one was not a zando what would happen if we put it on the machine?”
  - “if this one was a zando, what would happen if we put it on the machine?”

Counterfactuals

Pretense Phase

- Confederate needs to borrow real machine and objects
- Introduce box + two wood blocks for pretend
- How do we pretend to make the machine go?
  - What do we pretend when we put each block on the machine?
  - Reverse roles of blocks ar repeat

Pretense

It Takes a Village

Collaborators and Support

- Clark Glymour
- Tom Griffiths
- Noah Goodman
- Caren Walker
- Chris Lucas
- Elizabeth Seiver
- Sophie Bridgers

- NSF
- The James S. McDonnell Foundation Causal Learning Collaborative